CLAIMS

1. A method of manufacturing a doped X-Ba-Cu-O material, the method comprising the steps of:

a) mixing an X-Ba-L-O or X-Ba-Cu-L-O material with an X-Ba-Cu-O material; and

b) crystallising the mixture;

wherein

each X is independently selected from a rare earth (Group IIIB) element, yttrium, a combination of rare earth elements, or a combination of yttrium and a rare earth element; and each L is one or more elements selected from U, Nb, Ta, Mo, W, Zr, Hf, Ag, Pt, Ru and Sn.

2. A method of manufacturing a doped X-Ba-Cu-O material as claimed in Claim 1 wherein the X-Ba-Cu-L-O and X-Ba-L-O material comprise material of general formula:

$X_wBa_xCu_yL_tO_z$

wherein each X and L is as defined hereinabove; and wherein

w is 1 to 4; x is 1 to 6; y is 0 to 4; t is 0.3 to 2; and z is 3 to 20

3. A method of manufacturing a doped X-Ba-Cu-O material as claimed in Claim 1 wherein the X-Ba-Cu-O material comprises material of the general formula

$X_aBa_bCu_cO_d$

wherein each X is as defined hereinabove, and wherein

a is 1 to 4; b is 1 to 6; c is 0.5 to 4; d is 3 to 20.

4. A method of manufacturing a doped X-Ba-Cu-O material as claimed in Claim 1, 2 or 3 wherein each X is independently selected from one or more of Y, Nd, Sm, Ga, Eu and Ho.

5. A method of manufacturing a doped X-Ba-Cu-O material as claimed in any preceding claim wherein w is 1, 2 or 3; x is 2 to 4; y is 0.1 to 1 for X-Ba-Cu-L-O materials; t is 0.5 to 1; and z is 4 to 15.

6. A method of manufacturing a doped X-Ba-Cu-O material as claimed in any of Claims 2 to 4 wherein a is 1, 2 or 3; b is 2 to 4; c is 1 to 3; and d is 4 to 15.

7. A method of manufacturing a doped X-Ba-Cu-O material as claimed in any preceding claim wherein the $X_aBa_bCu_cO_d$ is added in step (a) to an amount of at least 50% w/w of the mixture.

8. A method of manufacturing a doped X-Ba-Cu-O material as claimed in any preceding claim wherein the $X_wBa_xCu_yL_tO_z$ is added in step (a) to an amount of at least 0.01% w/w of the total weight of the mixture produced in step (a).

9. A method of manufacturing a doped X-Ba-Cu-O material as claimed in any preceding claim wherein the $X_wBa_xCu_yL_tO_z$ is a solid.

10. A method of manufacturing a doped X-Ba-Cu-O material as claimed in any preceding claim wherein the $X_aBa_bCu_cO_d$ is in a molten or liquid form, and/or the method comprises a step prior to step (a)of substantially melting the $X_aBa_bCu_cO_d$.

11. A method of manufacturing a doped X-Ba-Cu-O material as claimed in any preceding claim wherein step (b) comprises single crystallisation.

12. A method of manufacturing a doped X-Ba-Cu-O material as claimed in Claim 11 wherein step (b) comprises crystallisation as a mixture of $X_wBa_xCu_yL_tO_z$ in molten $X_aBa_bCu_cO_d$.

13. A method of manufacturing a doped X-Ba-Cu-O material as claimed in Claim 11 or 12 wherein step (b) comprises providing in a receptable a mixture of $X_aBa_bCu_cO_d$ and $X_wBa_xCu_yL_tO_z$; melting the mixture; providing a seed or key to the receptacle; and subsequently manipulating the temperature of, or in the region of, the seed or key, to induce crystallisation of the molten mixture.

14. A method of manufacturing a doped X-Ba-Cu-O material as claimed in Claim 13 wherein the $X_aBa_bCu_cO_d$ and $X_wBa_xCu_yL_tO_z$ is added to the receptacle in solid form and the mixture melted.

15. A method of manufacturing a doped X-Ba-Cu-O material as claimed in Claim 13 wherein the $X_aBa_bCu_cO_d$ is melted in the receptacle and solid $X_wBa_xCu_yL_tO_z$ is added to the molten material.

16. A method of manufacturing a doped X-Ba-Cu-O material as claimed in Claim 13 wherein the seed or key is added to the molten mixture or added prior to melting the mixture.

17. A method of manufacturing a doped X-Ba-Cu-O material as claimed in Claim 16 wherein the seed or key is preferably a crystal of compatible crystallographic and chemical structure to the $X_aBa_bCu_cO_d$.

18. A method of manufacturing a doped X-Ba-Cu-O material as claimed in Claim 16 or 17 wherein the seed crystal is the identical $X_aBa_bCu_cO_d$ material or $X_aBa_bCu_cO_d$ material with a different X atom to the $X_aBa_bCu_cO_d$ material being crystallised.

19. A method of manufacturing a doped X-Ba-Cu-O material as claimed in any preceding claim wherein the resultant doped X-Ba-Cu-O crystal is annealed at between 400°C and 700°C.

20. A method of manufacturing a doped X-Ba-Cu-O material as claimed in any preceding claim further comprising mixing Y_2O_3 with the mixture produced in step (a).

21. A method of manufacturing a doped X-Ba-Cu-O material as claimed in any preceding claim further comprising adding Pt to the mixture produced in step (a).

22. A doped material manufactured by the method of any one of Claims 1 to 21.